

Borehole

51-04-06

Log Event A

**Borehole Information**

Farm : <u>TX</u>	Tank : <u>TX-104</u>	Site Number : <u>299-W15-154</u>
N-Coord : <u>41,608</u>	W-Coord : <u>76,058</u>	TOC Elevation : <u>670.00</u>
Water Level, ft :	Date Drilled : <u>4/30/1976</u>	

**Casing Record**

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

**Borehole Notes:**

This borehole was drilled in April 1976. The borehole was started with 20 ft of 8-in. casing and drilled to a depth of 105 ft using 6-in. casing. The 6-in. casing was withdrawn to the completion depth of 100 ft. The bottom 5 ft of the borehole was filled with 11 gal of cement grout. The 8-in. starter casing was removed and 160 gal of grout was injected into the annulus between this segment of the borehole wall and the permanent 6-in. casing. The casing was not perforated.

The concrete tank footing was encountered at a depth of 47 ft. The drill string was withdrawn to a depth of 20 ft, and 10 ft of the 8-in. starter casing was pulled back. The drill string was then angled sufficiently to allow the bottom of the string to clear the footing. The interval between depths of 20 and 47 ft was re-drilled. This operation resulted in considerable reaming, spalling, and caving of the upper portion of the borehole; accordingly, a substantial thickness of grout may exist between the surface and a depth of about 47 ft.

The borehole casing is even with the ground surface. The SGLS was able to reach a depth of 95.5 ft. The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

**Equipment Information**

Logging System : <u>1</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1996</u>	Calibration Reference : <u>GJPO-HAN-5</u>	Logging Procedure : <u>P-GJPO-1783</u>

**Log Run Information**

Log Run Number : <u>1</u>	Log Run Date : <u>4/11/1996</u>	Logging Engineer: <u>Mike Widdop</u>
Start Depth, ft.: <u>95.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>51.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

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Log Run Number :	<u>2</u>	Log Run Date :	<u>4/12/1996</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>52.5</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>L</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>0.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

## Analysis Information

Analyst : E.P. Baumgartner

Data Processing Reference : P-GJPO-1787

Analysis Date : 8/14/1996

### Analysis Notes :

The logging of this borehole was completed in two runs using the SGLS. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and system efficiency, confirming the SGLS system was operating within specifications. The energy calibration and peak-shape calibration from these verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing-correction factors for a 0.280-in.-thick steel casing were applied during analysis.

A depth overlap, where data were collected by separate logging runs at the same depth, occurred in this borehole between depths of 51.5 and 52.5 ft. The calculated concentrations of the natural radionuclides (K-40, U-238, Th-232) using the separate data sets at the overlapping depth points were within the statistical uncertainty of the measurements, indicating very good repeatability of the radionuclide concentration measurements.

Cs-137 and processed U-235 and U-238 were detected at different locations in the borehole. Cs-137 was detected semicontinuously from the surface to 34 ft at concentration values of less than 1 pCi/g, except for the measurements at the ground surface and at 1 ft in depth. Cs-137 was not detected in this borehole below a depth of 37.5 ft.

The calculated Cs-137 concentrations in the upper 20 ft of the borehole are understated because no compensation has been made for the grout injected between the borehole wall and the permanent 6-in. casing in the interval drilled with the 8-in. starter casing. Because the first 50 ft of the borehole passes through a uniform section of back fill (the coarse-grained sediments facies of the Hanford formation), the K-40 concentration would normally be constant within this interval. The background K-40 concentration in the grouted upper 20 ft of the borehole decreases between depths of 20 and 50 ft to 50 percent or less of the concentration measured in the ungrouted section. This suggests that the measured Cs-137 concentrations are understated by 100 percent or more.

Processed U-235 was detected from 63 to 77 ft with concentration values less than 2 pCi/g. Processed U-238 was detected semicontinuously from 62.5 to 77 ft with a maximum concentration value of about 48 pCi/g.

The K-40 concentration log has a steep increase at 49.5 ft from a mean of about 12 pCi/g to a mean of 20 pCi/g.

Details regarding the interpretation of the data for this borehole are presented in the Tank Summary Data



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Report for tank TX-104.

**Log Plot Notes:**

Separate log plots show the man-made (e.g., Cs-137) and the naturally occurring radionuclides (e.g., K-40, U-238, and Th-232). The natural radionuclides can be used for lithologic interpretations. The headings of these plots identify the energy peak for the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainty for the calculated concentrations at the 95-percent confidence level. The MDL is shown by open circles on the plots. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made radionuclides, the naturally occurring radionuclides, the total gamma count derived from the SGLS and the Tank Farm gross gamma log. The gross gamma plot displays the latest available digital data with no attempt to adjust the depths to coincide with the SGLS data.